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That I am knowledgeable in the English language and in the language in which the below identified Japanese patent application was filed, and that I believe the English translation of the Japanese Patent Application No. 2001-034796 filed on February 13, 2001 is a true and complete translation of the above identified application as filed.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

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[TITLE OF THE INVENTION] IMAGE SENSING SYSTEM

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SPECIFICATION

[TITLE OF THE INVENTION]

IMAGE SENSING SYSTEM

[Scope of Claims for a Patent]

[Claim1] An image sensing system comprising a digital
5 still camera and an image data receiving apparatus,
wherein said digital still camera includes:

image sensing means for sensing the image of a
subject and outputting main-image data representing the
image of the subject;

10 recording control means for recording the main-
image data output from said image sensing means on a
recording medium in association with an identification
code that identifies the image of the subject obtained
by said recording control means;

15 thumbnail-image data generating means for
generating thumbnail-image data that represents a
thumbnail image the amount of data whereof is less than
that of the image of the subject represented by the
main-image data output from said image sensing means;

20 and

thumbnail-image data transmitting means for
transmitting the thumbnail-image data generated by said
thumbnail-image data generating means to said image
data receiving apparatus in association with the
25 identification code that corresponds to the
corresponding image of the subject; and
said image data receiving apparatus includes:

image data receiving means for receiving
thumbnail-image data transmitted from said thumbnail-
image data generating means of said digital still
camera and with which the identification code has been
5 associated; and

display control means for controlling a display
device in such a manner that the thumbnail image
represented by the thumbnail-image data received by
said image data receiving means will be displayed in
10 association with the corresponding identification code.

[Claim2] The image sensing system according to claim
1, wherein said image data receiving apparatus further
includes:

code input means; and
15 output means for reading main-image data, which
corresponds to the identification code entered from
said identification code input device, from the
recording medium and outputting the main-image data.

[Claim3] The image sensing system according to claim
20 2, wherein said image data receiving apparatus further
includes:

user code input means for entering a code that
specifies a user;

user code discriminating means for determining
25 whether the user code entered from said user code input
means is legitimate; and

printer control means for controlling a printer in

such a manner that the image of a subject represented by main-image data output from said output means will be printed in response to a determination by said user code discriminating means that the entered user code is 5 legitimate.

[Claim4] A digital still camera comprising:

image sensing means for sensing the image of a subject and outputting main-image data representing the image of the subject;

10 first recording control means for recording the main-image data output from said image sensing device on a recording medium in association with an identification code that identifies the image of the subject obtained by said image sensing means;

15 thumbnail-image data generating means for generating thumbnail-image data that represents a thumbnail image the amount of data whereof is less than that of the image of the subject represented by the main-image data output from said image sensing means;

20 and

thumbnail-image data transmitting means for transmitting the thumbnail-image data generated by said thumbnail-image data generating means to an image data receiving apparatus in association with the 25 identification code that corresponds to the corresponding image of the subject.

[Claim5] The digital still camera according to claim

4, further comprising image-sensing control means for allowing succeeding sensing of the image of a subject by said image sensing means in response to completion of recording of the main-image data on the recording 5 medium by said first recording control means and of transmission of the thumbnail-image data by said thumbnail-image data transmitting means.

[Claim6] The digital still camera according to claim 4, wherein a data line that applies main-image data 10 from said image sensing means to said first recording control means and a data line that applies thumbnail-image data from said thumbnail-image data generating means to said thumbnail-image data transmitting means have portions in common;

15 said first recording control means recording the main-image data on the recording medium in response to pressing of a shutter-release button;

 said camera further comprising:

 a buffer memory for temporarily storing main-image 20 data that is output from said image sensing means;

 first discriminating means for determining whether the shutter-release button has been pressed during transmission of thumbnail-image data by said thumbnail-image data transmitting means;

25 memory control means for controlling said buffer memory in such a manner that main-image data that is output from said image sensing means is stored in said

buffer memory temporarily in response to a determination by said first discriminating means that the shutter-release button has been pressed; and

5 second recording control means for recording the main-image data, which has been stored temporarily in said buffer memory, on the recording medium in response to a determination that transmission of thumbnail-image data by said thumbnail-image data transmitting means has been completed.

10 [Claim7] An image data receiving apparatus comprising:
image data receiving means for receiving thumbnail-image data transmitted from a digital still camera and with which the identification code has been associated; and

15 display control means for controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received by said image data receiving means will be displayed in association with the corresponding identification code.

20 [Claim8] An image data communication system comprising an image data transmitting apparatus and an image data receiving apparatus that are capable of communicating with each other, wherein said image data receiving apparatus includes:
image data receiving means for receiving thumbnail-image data transmitted from a digital still camera and with which has been associated an

identification code that identifies the image of a subject;

5 display control means for controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received by said image data receiving device will be displayed in association with the corresponding identification code;

identification code input means for entering the identification code; and

10 identification-code data transmitting means for transmitting data, which represents the identification code entered by said identification code input means, to said image data transmitting apparatus; and

said image data transmitting apparatus includes:

15 identification-code data receiving means for receiving data representing an identification code transmitted from said identification-code data transmitting means of said image data receiving apparatus;

20 reading means for reading main-image data, which corresponds to an identification code represented by identification-code data received by said identification-code data receiving means, from a recording medium on which has been recorded the main-
25 image data with which the identification code is associated; and

main-image data transmitting means for

transmitting the main-image data read by said reading means to said image data receiving apparatus.

[Claim9] An image data receiving apparatus comprising:

 image data receiving means for receiving
5 thumbnail-image data transmitted from a digital still camera and with which has been associated an identification code that identifies the image of a subject;

 display control means for controlling a display
10 device in such a manner that the thumbnail image represented by the thumbnail-image data received by said image data receiving means will be displayed in association with the corresponding identification code;
 identification code input means for entering the
15 identification code; and

 identification-code data transmitting means for transmitting data, which represents the identification code entered by said identification code input means, to an image data transmitting apparatus.

20 [Claim10] An image data transmitting apparatus comprising:

 identification-code data receiving means for receiving data representing an identification code transmitted from an image data receiving apparatus;
25 reading means for reading main-image data, which corresponds to an identification code represented by identification-code data received by said

identification-code data receiving means, from a recording medium on which has been recorded the main-image data with which the identification code is associated; and

5 main-image data transmitting means for transmitting the main-image data read by said reading device to said image data receiving apparatus.

[Claim11] A method of controlling operation of digital still camera, comprising the steps of:

10 sensing the image of a subject and outputting main-image data representing the image of the subject; recording the main-image data obtained by image sensing on a recording medium in association with an identification code that identifies the obtained image
15 of the subject;

generating thumbnail-image data that represents a thumbnail image the amount of data whereof is less than that of the image of the subject represented by the main-image data obtained by image sensing; and

20 transmitting the thumbnail-image data generated to an image data receiving apparatus in association with the identification code that corresponds to the corresponding image of the subject.

[Claim12] A method of controlling operation of an image data receiving apparatus, comprising the steps of:

receiving thumbnail-image data transmitted from a

digital still camera and with which has been associated an identification code of a corresponding image of a subject; and

5 controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received will be displayed in association with the corresponding identification code.

[Claim13] A method of controlling operation of an image data receiving apparatus, comprising the steps 10 of:

receiving thumbnail-image data transmitted from a digital still camera and with which has been associated an identification code that identifies the image of a subject;

15 controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received will be displayed in association with the corresponding identification code; and

transmitting data, which represents the entered 20 identification code, to an image data transmitting apparatus.

[Claim14] A method of controlling operation of an image data transmitting apparatus, comprising the steps of:

25 receiving data representing an identification code transmitted from an image data receiving apparatus; reading main-image data, which corresponds to an

identification code represented by received identification-code data, from a recording medium on which has been recorded the main-image data with which the identification code is associated; and

5 transmitting the read main-image data to said image data receiving apparatus.

[Detailed Description of the Invention]

[0001]

[Technical Field]

10 This invention relates to an image sensing system, a digital still camera and an image data receiving apparatus that construct the image sensing system, an image data communication system, an image data transmitting apparatus and an image data receiving apparatus that construct the image data communication system, a method of controlling the operation of a digital still camera, a method of controlling the operation of an image data receiving apparatus and a method of controlling the operation of an image data transmitting apparatus.

15 This invention relates to an image sensing system, a digital still camera and an image data receiving apparatus that construct the image sensing system, an image data communication system, an image data transmitting apparatus and an image data receiving apparatus that construct the image data communication system, a method of controlling the operation of a digital still camera, a method of controlling the operation of an image data receiving apparatus and a method of controlling the operation of an image data transmitting apparatus.

20 This invention relates to an image sensing system, a digital still camera and an image data receiving apparatus that construct the image sensing system, an image data communication system, an image data transmitting apparatus and an image data receiving apparatus that construct the image data communication system, a method of controlling the operation of a digital still camera, a method of controlling the operation of an image data receiving apparatus and a method of controlling the operation of an image data transmitting apparatus.

[0002]

[Background of the Invention]

Consideration has been given to a system in which image data obtained by image sensing using a digital still camera is transmitted to an image data receiving apparatus by utilizing a short-distance communication technique. When the image of a subject is sensed using

the digital still camera in this system, image data representing the image of the subject is stored on a memory card loaded in the digital still camera and is transmitted to the image data receiving apparatus.

5 [0003]

When the image data transmitted from the digital still camera is received by the image data receiving apparatus, the image of the subject represented by the received image data is displayed on the display screen of a display device connected to the image data receiving apparatus. The user can observe the image of the subject displayed on the large display screen of the display device rather than on the small display screen provided on the back of the digital still 10 camera. 15

[0004]

As the number of pixels used in the CCD of a digital still camera increases, so does the amount of image data obtained by the sensing of an image. When 20 the amount of data increases, the time needed to transmit image data from the digital still camera to the image data receiving apparatus becomes longer. This lengthens also the time from sensing of the image of the subject to display of the image on the display 25 device connected to the image data receiving apparatus.

[0005]

[Disclosure of the Invention]

Accordingly, an object of the present invention is to shorten the time it takes for the image of a subject to be displayed on the display screen of a display device connected to an image data receiving apparatus.

5 [0006]

Another object of the present invention is to so arrange it that desired main-image data can be acquired in an image data receiving apparatus.

[0007]

10 According to a first aspect of the present invention, there is provided an image sensing system comprising a digital still camera (inclusive of a personal digital assistant having a camera function) and an image data receiving apparatus.

15 [0008]

The digital still camera includes image sensing means for sensing the image of a subject and outputting main-image data representing the image of the subject; recording control means for recording the main-image data output from the image sensing means on a recording medium in association with an identification code that identifies the image of the subject; thumbnail-image data generating means for generating thumbnail-image data that represents a thumbnail image the amount of 20 data whereof is less than that of the image of the subject represented by the main-image data output from the image sensing means; and thumbnail-image data 25

transmitting means for transmitting the thumbnail-image data generated by the thumbnail-image data generating means to the image data receiving apparatus in association with the identification code that

5 corresponds to the corresponding image of the subject.

[0009]

The image data receiving apparatus includes image data receiving means for receiving thumbnail-image data transmitted from the thumbnail-image data generating means of the digital still camera and with which the identification code has been associated; and display control means for controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received by the image data receiving means will be displayed in association with the corresponding identification code.

15

[0010]

The digital still camera and image data receiving apparatus may be constructed as stand-alone devices

20 that are independent of each other.

[0011]

The first aspect of the present invention provides also a method of controlling operation of the above-described digital still camera. Specifically, the

25 invention provides a method of controlling operation of a digital camera comprising the steps of sensing the image of a subject and outputting main-image data

representing the image of the subject; recording the main-image data obtained by image sensing on a recording medium in association with an identification code that identifies the obtained image of the subject;

5 generating thumbnail-image data that represents a thumbnail image the amount of data whereof is less than that of the image of the subject represented by the main-image data obtained by image sensing; and transmitting the thumbnail-image data generated to an

10 image data receiving apparatus in association with the identification code that corresponds to the corresponding image of the subject.

[0012]

The first aspect of the present invention further provides a method of controlling operation of the above-described image data receiving apparatus. Specifically, the invention provides a method of controlling operation of an image data receiving apparatus comprising the steps of receiving thumbnail-
20 image data transmitted from a digital still camera and with which has been associated an identification code of a corresponding image of a subject; and controlling a display device in such a manner that the thumbnail image represented by the thumbnail-image data received
25 will be displayed in association with the corresponding identification code.

[0013]

In accordance with the first aspect of the present invention, main-image data representing the image of a subject is obtained when the image of the subject is sensed by a digital still camera. The main-image data 5 is recorded on a recording medium (which may or may not be removable from the digital still camera) in association with an identification code that identifies the image of the subject. A thumbnail image corresponding to the image of the subject represented 10 by the main-image data is generated. The data representing the generated thumbnail image is transmitted from the digital still camera to an image data receiving apparatus in association with an identification code of the corresponding image of the 15 subject.

[0014]

When the thumbnail-image data transmitted from the digital still camera is received by the image data receiving apparatus, the thumbnail image represented by 20 the received thumbnail-image data is displayed on the display screen of the display device.

[0015]

The image data transmitted from the digital still camera to the image data receiving apparatus is 25 thumbnail-image data that contains less data than the main-image data. This makes transmission time shorter than when the main-image data is transmitted. The

image (thumbnail image) corresponding to the image of the subject obtained by image sensing can be displayed comparatively promptly.

[0016]

5 The image data receiving apparatus preferably is further provided with identification code input means and output means for reading main-image data, which corresponds to the identification code entered from the identification code input device, from the recording 10 medium and outputting the main-image data.

[0017]

 The user enters an identification code regarding the displayed thumbnail image. When this done, the main-image data corresponding to the entered 15 identification code is read from the recording medium loaded in the digital still camera. The read main-image data is output from the image data receiving apparatus.

[0018]

20 The user observes a thumbnail image and can obtain the main-image data that corresponds to this thumbnail image. Since the main-image data is greater in quantity than the thumbnail-image data, the main image can withstand close scrutiny when it is printed. Thus 25 it is possible to obtain high-resolution image data while maintaining the speedy display of the image (the thumbnail image) that corresponds to the image of the

subject.

[0019]

The image data receiving apparatus may further comprise user code input means for entering a code that 5 specifies a user; user code discriminating means for determining whether the user code entered from the user code input means is legitimate; and printer control means for controlling a printer in such a manner that the image of a subject represented by main-image data 10 output from the output means will be printed in response to a determination by the user code discriminating means that the entered user code is legitimate.

[0020]

15 Thus, an authorized user is capable of printing an image.

[0021]

The digital still camera may further comprise image-sensing control means for allowing succeeding 20 sensing of the image of a subject by the image sensing means in response to completion of recording of the main-image data on the recording medium by the first recording control means and of transmission of the thumbnail-image data by the thumbnail-image data 25 transmitting means.

[0022]

The next image sensing operation is allowed in

response to completion of recording of the main-image data on the recording medium and of transmission of the thumbnail-image data to the image data receiving apparatus. As a result, processing for sensing the 5 image of a subject will not be executed during the course of recording processing and transmission processing. This makes it possible to prevent destruction of the main-image data and thumbnail-image data.

10 [0023]

A data line that applies main-image data from the image sensing means to the first recording control means and a data line that applies thumbnail-image data from the thumbnail-image data generating means to the 15 thumbnail-image data transmitting means may have portions in common. If such is the case, the first recording control means may record the main-image data on the recording medium in response to pressing of a shutter-release button. The digital still camera 20 further comprises a buffer memory for temporarily storing main-image data that is output from the image sensing means; first discriminating means for determining whether the shutter-release button has been pressed during transmission of thumbnail-image data by 25 the thumbnail-image data transmitting means; memory control means for controlling the buffer memory in such a manner that main-image data that is output from the

image sensing means is stored in the buffer memory temporarily in response to a determination by the first discriminating means that the shutter-release button has been pressed; and second recording control means 5 for recording the main-image data, which has been stored temporarily in the buffer memory, on the recording medium in response to a determination that transmission of thumbnail-image data by the thumbnail-image data transmitting means has been completed.

10 [0024]

Main-image data that has been obtained by pressing the shutter-release button is stored in the buffer memory temporarily until transmission of the thumbnail-image data to the image-data receiving apparatus is 15 completed. When the transmission of the thumbnail-image data to the image data receiving apparatus ends, the main-image data is read out of the buffer memory and recorded on the recording medium. Since recording of the main-image data on the recording medium will not 20 be carried out during transmission of the thumbnail-image data, conflict between these two types of image data can be prevented even if a data line that applies the main-image data from the image sensing device to the first recording controller and a data line that 25 applies thumbnail-image data from the thumbnail-image data generating device to the thumbnail-image data transmitting device have portions in common.

[0025]

A second aspect of the present invention relates to an image data communication system comprising an image data transmitting apparatus and an image data receiving apparatus that are capable of communicating 5 with each other.

[0026]

The data receiving apparatus comprises image data receiving means for receiving thumbnail-image data 10 transmitted from a digital still camera and with which has been associated an identification code that identifies the image of a subject; display control means for controlling a display device in such a manner that the thumbnail image represented by the thumbnail- 15 image data received by the image data receiving means will be displayed in association with the corresponding identification code; identification code input means for entering the identification code; and identification-code data transmitting means for 20 transmitting data, which represents the identification code entered by the identification code input means, to the image data transmitting apparatus.

[0027]

The image data transmitting apparatus comprises 25 identification-code data receiving means for receiving data representing an identification code transmitted from the identification-code data transmitting means of

the image data receiving apparatus; reading means for reading main-image data, which corresponds to an identification code represented by identification-code data received by the identification-code data receiving means, from a recording medium on which has been recorded the main-image data with which the identification code is associated; and main-image data transmitting means for transmitting the main-image data read by the reading device to the image data receiving apparatus.

[0028]

The second aspect of the present invention provides also a method of controlling operation of an image data receiving apparatus. Specifically, the invention provides a method of controlling operation of an image data receiving apparatus comprising the steps of receiving thumbnail-image data transmitted from a digital still camera and with which has been associated an identification code that identifies the image of a subject; controlling a display device in such a manner that the thumbnail image represented by the received thumbnail-image data will be displayed in association with the corresponding identification code; and transmitting data, which represents the entered identification code, to the image data transmitting apparatus.

[0029]

The second aspect of the present invention provides also a method of controlling operation of an image data transmitting apparatus. Specifically, the invention provides a method of controlling operation of 5 an image data transmitting apparatus comprising the steps of receiving data representing an identification code transmitted from an image data receiving apparatus; reading main-image data, which corresponds to an identification code represented by received 10 identification-code data, from a recording medium on which has been recorded the main-image data with which the identification code is associated; and transmitting the read main-image data to the image data receiving apparatus.

15 [0030]

The second aspect of the present invention provides also method of controlling operation of an image data transmitting apparatus. Specifically, the invention provides a method of controlling operation of 20 an image data transmitting apparatus, comprising the steps of receiving data representing an identification code transmitted from an image data receiving apparatus; reading main-image data, which corresponds to an identification code represented by received 25 identification-code data, from a recording medium on which has been recorded the main-image data with which the identification code is associated; and transmitting

the read main-image data to said image data receiving apparatus.

[0031]

In accordance with the second aspect of the
5 present invention, thumbnail-image data, which has been transmitted from a digital still camera and with which an identification code has been associated is received by an image data receiving apparatus. The thumbnail image represented by the thumbnail-image data is
10 displayed in association with the identification code.

[0032]

When an identification code is entered, data representing the identification code is transmitted from the image data receiving apparatus to an image
15 data transmitting apparatus.

[0033]

The image data transmitting apparatus receives data representing an identification code transmitted from the image data receiving apparatus. A recording
20 medium on which main-image data associated with an identification code has been recorded is loaded in the image data transmitting apparatus or is connected thereto in readable fashion. Main-image data corresponding to a received identification code is read
25 from the recording medium. The read main-image data is transmitted from the image data transmitting apparatus to the image data receiving apparatus.

[0034]

The necessary main-image data can be obtained at the image data receiving apparatus. Since the main-image data contains more data than the thumbnail-image data, a high-resolution image can be obtained. This makes it possible to obtain an image that can withstand scrutiny even when printed.

[0035]

[Description of the Embodiments]

10 Fig. 1, which illustrates a first embodiment of the invention, shows the manner in which an image sensing system is used.

[0036]

15 The image sensing system comprises a digital still camera 1 and a file apparatus 20 capable of communicating with each other over a short distance.

[0037]

20 A photographer CA takes the picture (senses the image) of a subject OB by using the digital still camera 1. The sensing of the image is performed in a photo studio, by way of example.

[0038]

25 A user (e.g., if the subject is a person, the user might be a member of this person's family) US waits in a room separate from the photo studio. The file apparatus 20 is placed in this room and has a display device connected to it.

[0039]

When pictures of the subject SU are taken by the
photographer CA using the digital still camera 1, the
latter generates thumbnail images of the images of the
5 subject. The generated thumbnail-image data is
transmitted from the digital still camera 1 to the file
apparatus 20.

[0040]

10 The thumbnail images of the subject whose image
has been sensed are displayed on the display screen of
the display device connected to the file apparatus 20
placed in the room separate from the studio. While
viewing the thumbnail images displayed, the user
selects the image to be printed.

15 [0041]

Thus, the image to be printed can be selected
while images of the subject SU are being sensed. Image
data transmitted from the digital still camera 1 to the
file apparatus 20 is thumbnail-image data and not the
20 image data obtained by sensing the image of the
subject. The thumbnail-image data is small in quantity
and therefore can be transmitted in a short period of
time. This means that the thumbnail images can be
displayed quickly. Further details will become
25 apparent from the description that follows.

[0042]

Fig. 2 is a block diagram showing the electrical

construction of the digital still camera 1.

[0043]

The overall operation of the digital still camera 1 is controlled by a CPU 11.

5 [0044]

The digital still camera 1 is provided with a mode switch 17 by which it is possible to set an ordinary imaging mode (in which the camera does not communicate with the file apparatus 20), a wireless communication 10 imaging mode (in which the camera communicates with the file apparatus 20) and a playback mode. A signal representing the mode set by the mode switch 17 is input to the CPU 11.

[0045]

15 The digital still camera 1 is further provided with a shutter button 13. A signal indicating that the shutter button 13 has been pressed also is input to the CPU 11.

[0046]

20 If the wireless communication imaging mode is selected by the mode switch 17 (the ordinary imaging mode and playback mode have no direct bearing upon this invention and need not be described), the image of the subject is formed on the photoreceptor surface of a 25 solid-state image sensing device (CCD, etc.) by an imaging lens 2. A video signal representing the image of the subject is output from the solid-state image

sensing device 3.

[0047]

The video signal is converted to digital image data by an analog/digital converter circuit 4. The 5 digital image data is applied to a display device 12 by a controller 6 via the CPU 11 so that the image of the subject is displayed on the display screen of the display device 12.

[0048]

10 If the shutter button 13 is pressed, image data (main-image data) output from the analog/digital converter circuit 4 is applied to a main-image memory 8, where the image data is stored. The main-image data is read out of the main-image memory 8 and input to an 15 image processing/compressing circuit 7. The latter executes compression processing and other image processing.

[0049]

An ID generating circuit 9 generates an image ID 20 for identifying an image.

[0050]

An image file is generated in such a manner that the generated image ID is recorded in the header of the image file and the compressed main-image data is 25 recorded in an image data recording area of the image file. The generated image file is applied to and recorded on a memory card 19 by the controller 6 via a

card interface 16.

[0051]

The main-image data that has been stored in the main-image memory 8 is subjected to compression 5 processing and the like by the image processing/compressing circuit 7 and thumbnail-image data is generated by the CPU 11, as mentioned above. The generated thumbnail-image data is applied to and stored in a thumbnail memory 10. The thumbnail-image 10 data is applied to an antenna 15 via a wireless interface 14. The thumbnail-image data is transmitted from the antenna 15 to the file apparatus 20.

[0052]

A data line for applying the compressed image data 15 to the card interface 16 and a data line 18 for applying the thumbnail-image data, which has been stored in the thumbnail memory 10, to the wireless interface 14 have portions in common. However, it goes without saying that mutually independent data lines may 20 be used.

[0053]

Fig. 3 is a block diagram illustrating the electrical construction of the file apparatus 20.

[0054]

25 The overall operation of the file apparatus 20 is controlled by a CPU 25.

[0055]

Thumbnail-image data transmitted from the digital still camera 1 as described above is received by an antenna 21. The thumbnail-image data received by the antenna 21 is applied to a controller 26 via a wireless interface 22. The thumbnail-image data is input to an analog/digital converter circuit 29 by the controller 26, whereby the data is converted to an analog video signal. The analog video signal is applied to a display device 30 so that the thumbnail image is displayed on the display screen of the display device 30.

[0056]

Fig. 4 shows an example of a display screen 33 of the display device 30.

[0057]

The display screen 33 is formed to have a number of display areas 34 for displaying thumbnail images. A thumbnail image represented by thumbnail-image data transmitted from the digital still camera 1 is displayed in each thumbnail-image display area 34.

[0058]

Displayed below each thumbnail image is the image ID (Image 001, etc.) of the thumbnail image. [This is the ID of the main image (the image represented by main-image data) that corresponds to the thumbnail image. Though the image ID of the thumbnail image and the ID of the main image that corresponds to this

thumbnail image are the same, the image IDs need not necessarily be the same as long as the corresponding relationship between the thumbnail image and the main image is known.] The thumbnail image and the main 5 image can be specified by the image ID.

[0059]

With reference again to Fig. 3, the file apparatus 20 is capable of being remote-controlled by a remote controller (not shown). A control signal transmitted 10 from the remote controller is received by a remote-control interface 24. The remote-control signal also includes data that indicates an image ID specified by the user.

[0060]

15 The received remote-control signal is input to the CPU 25. If the remote-control signal includes data indicative of an image ID, the data representing the image ID is extracted from the signal by the CPU 25. The data representing the image ID is applied to and 20 stored in a buffer memory 27 by the controller 26.

[0061]

The file apparatus 20 is provided with a card interface 23. The memory card 19 on which an image file containing compressed main-image data has been 25 recorded in the manner described above can be loaded in the file apparatus 20. When the memory card 19 is loaded in the file apparatus 20, the header of the

image file recorded on the memory card 19 is read. The image ID that has been recorded in the header is input to the CPU 25 via the card interface 23.

[0062]

5 The CPU 25 compares the image ID read from the memory card 19 and the image ID that has been stored in the buffer memory 27. If an image ID the same as the image ID read from the memory card 19 has been stored in the buffer memory 27, then it is judged that the 10 main-image data specified by the image ID read from the memory card 27 represents the main image specified by the user. The main-image data for which the same image ID has been stored in the buffer memory 27 is read from the memory card 19.

15 [0063]

 Since the main-image data that has been read from the memory card 19 is compressed data, this data is applied to an expansion/image processing circuit 28 by the controller 26, whereby the compressed main-image 20 data is subjected to predetermined playback processing such as expansion.

[0064]

 The expanded main-image data is applied to a printer interface 31 by the controller 26. The main 25 image corresponding to the thumbnail image selected by the user is printed by a printer 41 connected to the printer interface 31.

[0065]

Figs. 5 and 6 are flowcharts illustrating processing executed by the digital still camera 1 and file apparatus 20.

5 [0066]

The power supply of the digital still camera 1 is turned on and the wireless communication imaging mode is selected by the photographer PH (step 51). As a result, data indicative of a connect command is 10 transmitted from the digital still camera 1 to the file apparatus 20 (step 52).

[0067]

When the connect command transmitted from the digital still camera 1 is received by the file 15 apparatus 20, the latter sends data indicating that a wireless connection has been made back to the digital still camera 1 (step 71). In addition, the file apparatus 20 creates image folders that are associated by the model name of the digital still camera 1, the 20 date, etc. (step 72).

[0068]

If data sent back from the file apparatus 20 indicating that the wireless connection has been established is received ("YES" at step 53), it is 25 determined whether the shutter button 13 has been pressed (step 54).

[0069]

If the shutter button 13 has been pressed ("YES" at step 54), the image of the subject SU is sensed (step 55), as described above, and main-image data representing the image of the subject is obtained. The 5 main-image data is stored in the main-image memory 8 temporarily (step 56). The main-image data stored in the main-image memory 8 may or may not be compressed by the image processing/compressing circuit 7, as mentioned earlier.

10 [0070]

The CPU 11 generates thumbnail-image data from the main-image data (step 57). The generated thumbnail-image data is stored in the thumbnail memory 10 (step 58).

15 [0071]

The ID generating circuit 9 generates an image ID with respect to the sensed image of the subject (step 59). When the image ID is generated, it is recorded in the header of the image file in which the corresponding 20 main-image data is stored. The main-image file having the image ID recorded in its header and the main-image data recorded in its image data recording area is recorded on the memory card 19 that has been inserted into the digital still camera 1 (step 60). Recording 25 processing continues until the recording of the main-image file ends (step 61).

[0072]

When recording of main-image data on the memory card 19 ends, the thumbnail-image data representing the thumbnail image that corresponds to the main image is recorded in the thumbnail-image data recording area of the thumbnail-image file and an image ID identical with the image ID of the corresponding main image is stored in the header. The thumbnail-image file is transmitted from the digital still camera 1 to the file apparatus 20 (step 62). Processing for transmitting the thumbnail-image file continues until transmission of the thumbnail-image file ends (step 63).

[0073]

If the memory card 19 that has been loaded in the digital still camera 1 runs out of vacant space ("YES" at step 64) or when photography ends, the photographer PH removes the memory card 19 from the digital still camera 1 (step 65).

[0074]

When a thumbnail-image file transmitted from the digital still camera 1 is received by the file apparatus 20, the received thumbnail-image file is stored in the buffer memory 27 (step 73). The thumbnail-image file is read out of the buffer memory 27 and applied to the display device 30. The thumbnail image and the image ID are displayed on the display screen 33 of the display device 30 (step 74), as shown in Fig. 4.

[0075]

If an image ID is designated by the user ("YES" at step 75), then data representing the designated image ID is stored in the buffer memory 27 (step 76).

5 [0076]

Fig. 7 is a flowchart illustrating print processing executed by the file apparatus 20.

[0077]

When sensing of the image of the subject SU ends, 10 the memory card 19 that has been extracted from the digital still camera 1 is loaded in the file apparatus 20 (step 81). The headers of main-image files that have been recorded on the memory card 19 are read and the image IDs that have been recorded in the headers 15 are read. From among the image IDs that have been read from the memory card 19, the main-image data corresponding to an image ID identical with the image ID that has been stored in the buffer memory 27 is read from the memory card 19 (step 82).

20 [0078]

The main-image data read from the memory card 19 represents the main image that corresponds to the thumbnail image designated by the user. The data representing this main image is stored in an image 25 folder already generated (step 83).

[0079]

The main-image data that has been stored in the

image folder is applied to the printer 40 via the printer interface 31 (step 40). The main image corresponding to the thumbnail image designated by the user is printed by the printer 40 (step 84). Since the 5 main image has a high resolution, a high-resolution main image is printed.

[0080]

Fig. 8 is a flowchart illustrating a modification of the processing executed by the digital still camera 10 1.

[0081]

Processing steps in Fig. 8 that are identical with those shown in Fig. 6 are designated by like step numbers and need not be described again.

15 [0082]

When an image ID is generated in the processing of Fig. 6, the generated image ID is stored in the header and the main-image file is recorded on the memory card 19 without confirming that the thumbnail-image file is 20 being transmitted to the file apparatus 20.

[0083]

By contrast, in the processing shown in Fig. 8, whether the thumbnail-image file is being transmitted to the file apparatus 20 is checked (step 66).

25 [0084]

If transmission of thumbnail-image file is in progress ("YES" at step 66), then the processing of

step 60 is skipped. Since transmission of the thumbnail-image data and recording of the main-image data will not take place simultaneously, a conflict of data can be prevented in the digital still camera 1
5 even if the data line 18 for applying the thumbnail-image data to the wireless interface 14 and the data line 18 for applying the main-image data to the card interface 16 have portions in common.

[0085]

10 When transmission of the thumbnail-image data ends ("YES" at step 63), then main-image data not yet recorded on the memory card 19 is recorded on the memory card 19 (step 67).

[0086]

15 Fig. 9 is a flowchart illustrating an example of print processing by the file apparatus.

[0087]

The header of a main-image file that has been recorded on the memory card 19 loaded in the file apparatus 20 is read (step 91). It is determined whether the image ID contained in the read header is the same as an image ID that has been stored in the buffer memory 27 (namely the image ID designated by the user) (step 92). If the two are not the same, a
20 command for reading out the next image file is applied (step 97). The header of the next image file is read.
25

[0088]

If the two image IDs are the same ("YES" at step 92), this means that the main-image file is one in which has been stored main-image data representing the main image that corresponds to the thumbnail image 5 designated by the user. The image data is read from the main-image file (step 93). The read main-image data is applied to the expansion/image processing circuit 28 and is subjected to playback processing such as expansion (step 94).

10 [0089]

A user code is entered by the user by employing the remote controller (step 95). It is determined whether the user code is one that authorizes printing. If the entered user code is authentic ("YES" at step 15 96), then the expanded main-image data is applied to the printer interface 31 (step 97) and the main image is printed by the printer 40.

[0090]

The processing of steps 91 to 93 is repeated for 20 all main-image files that have been recorded on the memory card 19 loaded in the file apparatus 20 (step 98).

[0091]

Figs. 10 and 11 illustrate a second embodiment of 25 the present invention.

[0092]

Fig. 10 shows the manner in which the image

sensing system according to this embodiment is used.

[0093]

The first embodiment is such that when the image of the subject OB is sensed, the memory card 19 on 5 which the main-image data has been recorded is removed from the digital still camera 1 and then loaded in the file apparatus 20. The main-image data that has been recorded on the loaded memory card 19 is read into the file apparatus 20.

10 [0094]

By contrast, in the example of use shown in Fig. 10, the memory card 19 that has been loaded in the digital still camera 1 is removed from the digital still camera 1 and is loaded in an image data 15 transmitting apparatus 100. The latter reads the main-image data that has been recorded on the memory card 19 and can transmit the data to a file apparatus 20A. The main-image data that has been transmitted from the image data transmitting apparatus 100 is received by 20 the file apparatus 20A. (The file apparatus 20A has the same structure as that of the file apparatus 20 but differs in that it transmits data indicative of an image ID to the image data transmitting apparatus 100). The labor involved in bringing the memory card 19 to 25 the other room and loading it in the file apparatus 20 is eliminated.

[0095]

The image data transmitting apparatus 100 can accept insertion of the memory card 19 and can transmit main-image data to the file apparatus 20A. It therefore has a structure substantially the same as 5 that of the digital still camera 1. An arrangement can be adopted in which the digital still camera 1 is used for the image data transmitting apparatus 100.

[0096]

Fig. 11 is a flowchart illustrating processing for 10 transmitting main-image data to the file apparatus using the image data transmitting apparatus according to the second embodiment.

[0097]

The digital still camera 1 is used to sense the 15 image of the subject SU, as described earlier. A main-image file whose image ID has been recorded in the header is recorded on the memory card 19 and a thumbnail-image file whose image ID has been recorded in the header is transmitted from the digital still camera 1 to the file apparatus 20.

[0098]

The memory card 19 is removed from the digital still camera 1 and is loaded in the image data transmitting apparatus 100 (step 111), whereupon the 25 wireless connect command is transmitted from the image data transmitting apparatus 100 to the file apparatus 20A (step 112).

[0099]

When the connect command transmitted from the image data transmitting apparatus 100 is received by the file apparatus 20A, a command to transmit the main-
5 image data having the image ID stored in the buffer memory 27 is transmitted from the file apparatus 20A to the image data transmitting apparatus 100 (step 121).

[0100]

When the transmit command that has been
10 transmitted from the file apparatus 20A is received by the image data transmitting apparatus 100, the main-
image file specified by the image ID for which the transmit command has been received is read out of the
memory card 19. The main-image file read out is
15 transmitted from the image data transmitting apparatus 100 to the file apparatus 20A (step 113).

[0101]

When the main-image file transmitted from the image data transmitting apparatus 100 is received by
20 the file apparatus 20A, the received main-image file is stored in the buffer memory 27 (step 122). The main-
image file stored in the buffer memory 27 is read out and applied to the printer 40, whereby the main image
corresponding to the thumbnail image selected by the
25 user is printed (step 123).

[0102]

In the embodiments described above, the digital

still camera 1 is used in a photo studio and the file apparatus 20 (20A) is used in another room. However, it goes without saying that separate rooms need not necessarily be used.

5 [0103]

Further, it goes without saying that some of the above circuitry may be implemented by software rather than hardware.

[0104]

10 Communication between the digital still camera and file apparatus may be short-distance wireless communication, which uses a 2.4-GHz carrier, or long-distance wireless communication. Further, if thumbnail-image data can be received, what communicates
15 with the digital still camera can be a printing system and not just a file apparatus. Furthermore, it will suffice if the size of a thumbnail image is smaller than that of the main image. Examples of thumbnail-image size are 160 ? 120 pixels and 640 ? 480 pixels
20 (VGA). In addition, communication is not limited to wireless communication; it is possible to use wired communication that utilizes copper wire or optical cable.

[Brief Description of the Drawings]

[Fig. 1] shows the manner in which an image sensing systems is used according to a first embodiment 5 of the present invention;

[Fig. 2] is a block diagram illustrating the electrical construction of a digital still camera according to this embodiment;

[Fig. 3] is a block diagram illustrating the 10 electrical construction of a file apparatus according to this embodiment;

[Fig. 4] illustrates examples of thumbnail images displayed on the display device of the file apparatus;

[Fig. 5] is flowcharts showing processing for 15 implementing communication between the digital still camera and the file apparatus according to this embodiments;

[Fig. 6] is flowcharts showing processing for 20 implementing communication between the digital still camera and the file apparatus according to this embodiments;

[Fig. 7] is a flowchart illustrating processing executed by the file apparatus according to this embodiment;

25 [Fig. 8] is a flowchart illustrating a modification of processing executed by the digital still camera;

[Fig. 9] is a flowchart illustrating print processing;

[Fig. 10] which illustrates a second embodiment of the invention, shows the manner in which an image 5 sensing system is used; and

[Fig. 11] is a flowchart illustrating processing for implementing communication between an image data transmitting apparatus and the file apparatus according to the second embodiment.

[Description of Character]

1 digital still camera
3 solid-state image sensing device
7 mode switch
5 8 main-image memory
9 ID generating circuit
10 thumbnail memory
11,25 CPU
12,30 display device
10 14,22 wireless interface
15,21 antenna
16,23 card interface
19 memory card
20,20A file apparatus
15 27 buffer memory
33 display screen
34 thumbnail-image display area
100 image data transmitting device

[Document Name]

ABSTRACT

[Abstract]

[Object] To display the image of subject OB obtained by image sensing to the display device
5 differing from the digital still camera 1, rapidly.

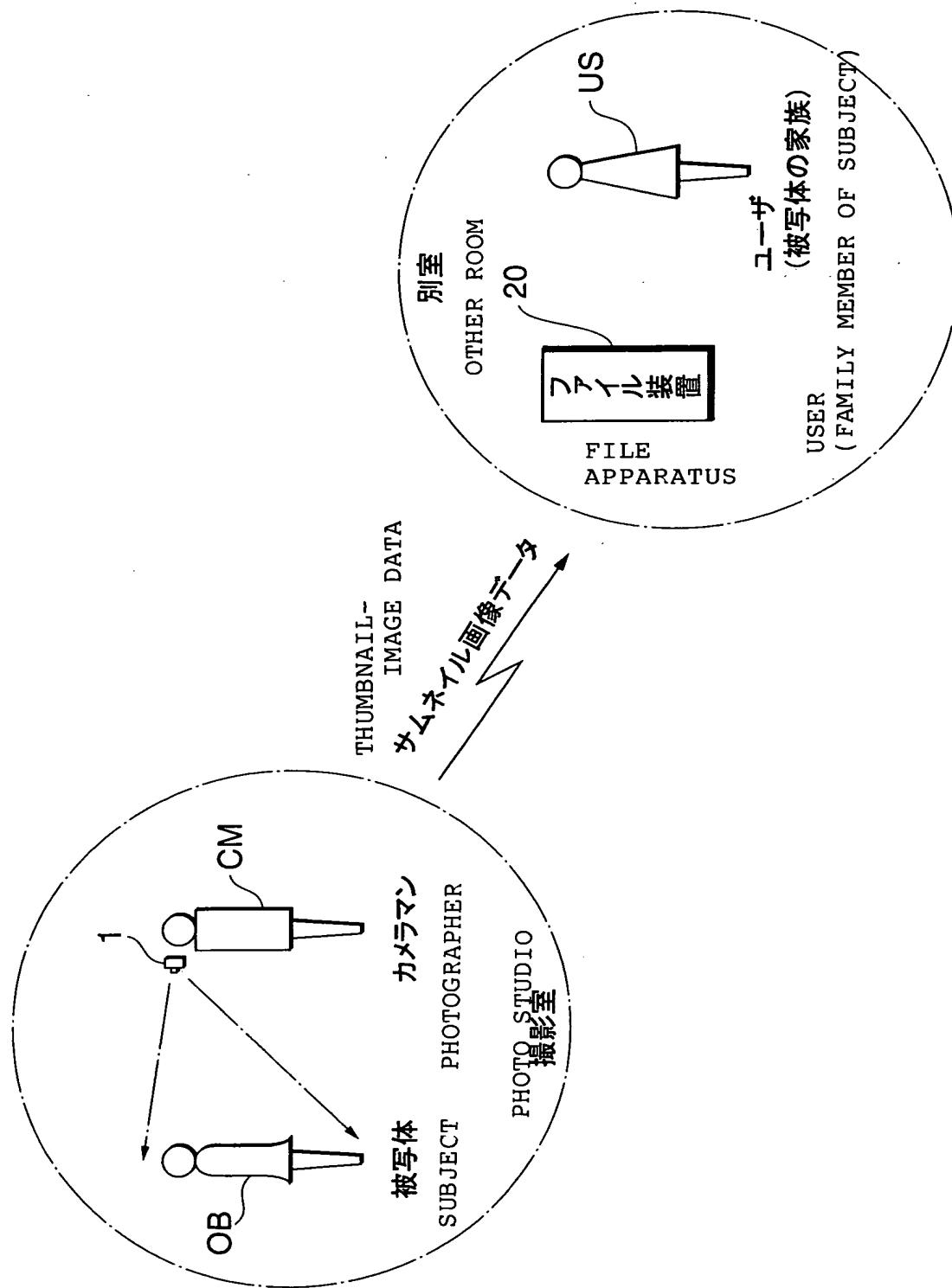
[Construction] The photographer CA sensed the subject using digital still camera in a photo studio. A thumbnail image containing less data than a high-resolution main image representing the image of the
10 subject is generated. Data representing the generated thumbnail image is transmitted to a file apparatus located in another room. The thumbnail-image data requires a shorter transmission time because it contains a smaller amount of data. As a result, the
15 thumbnail image representing the subject OB is displayed more rapidly.

[Selected Drawing] Fig. 1

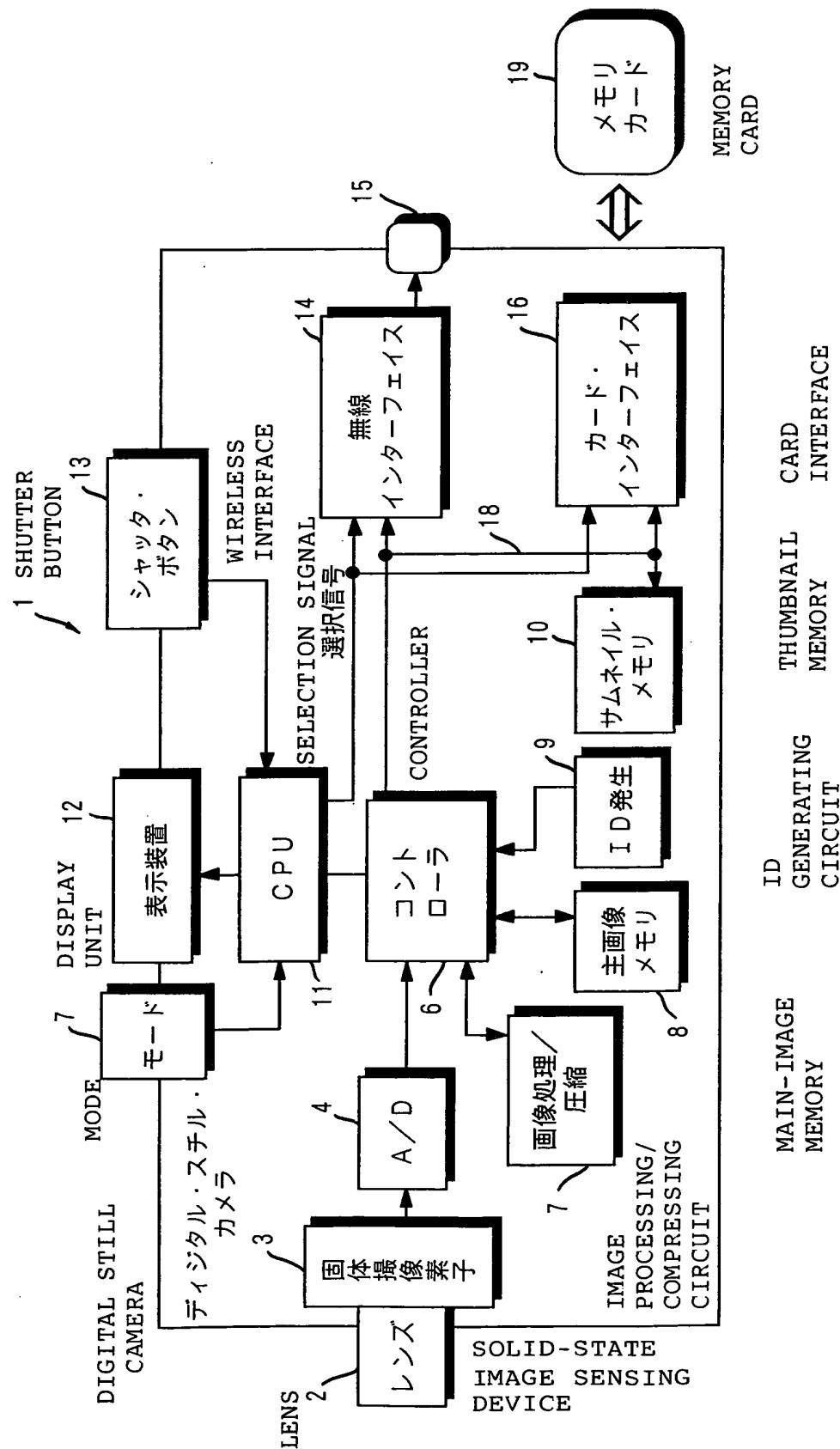
Document Name Drawings

【書類名】 図面

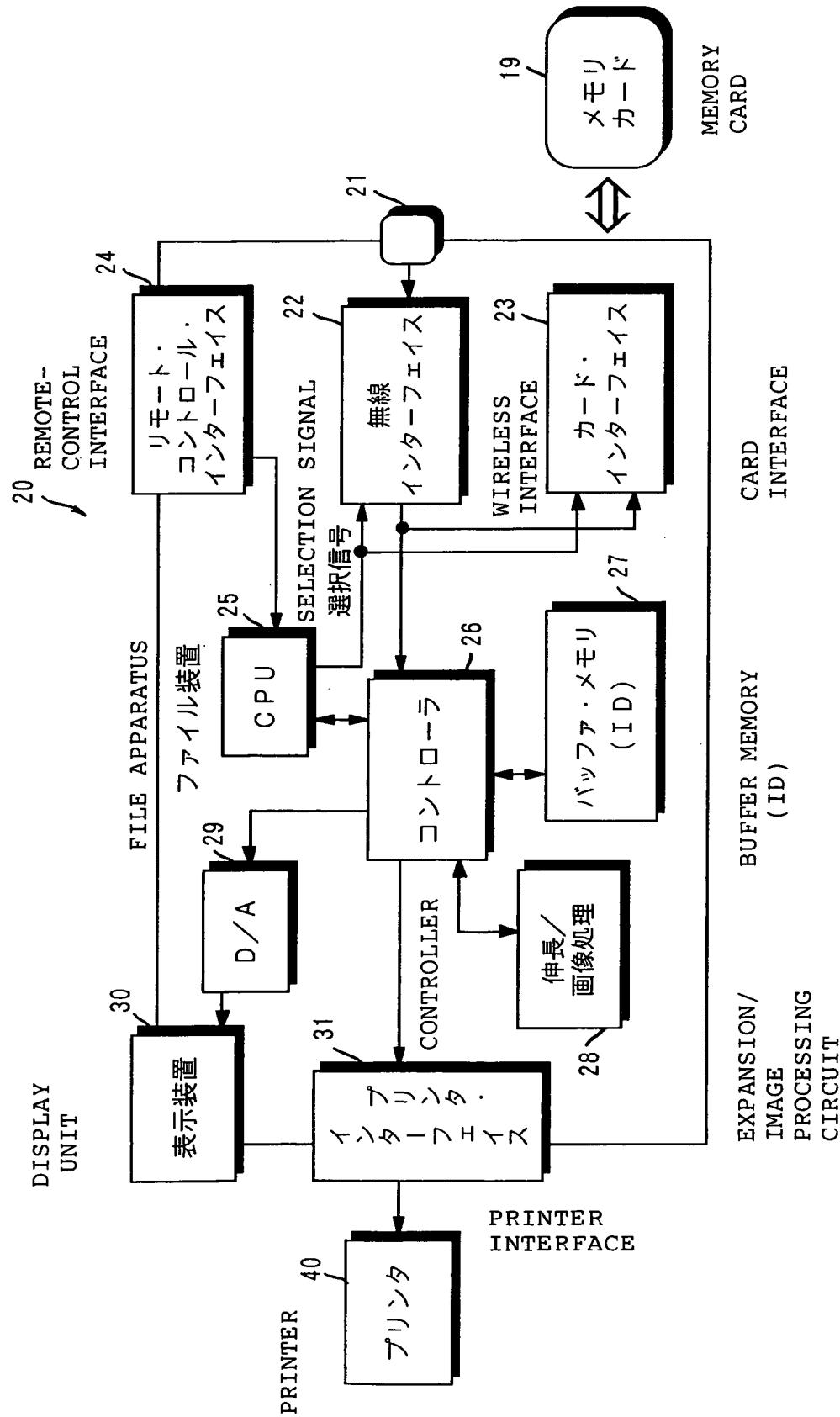
【図 1】 FIG. 1



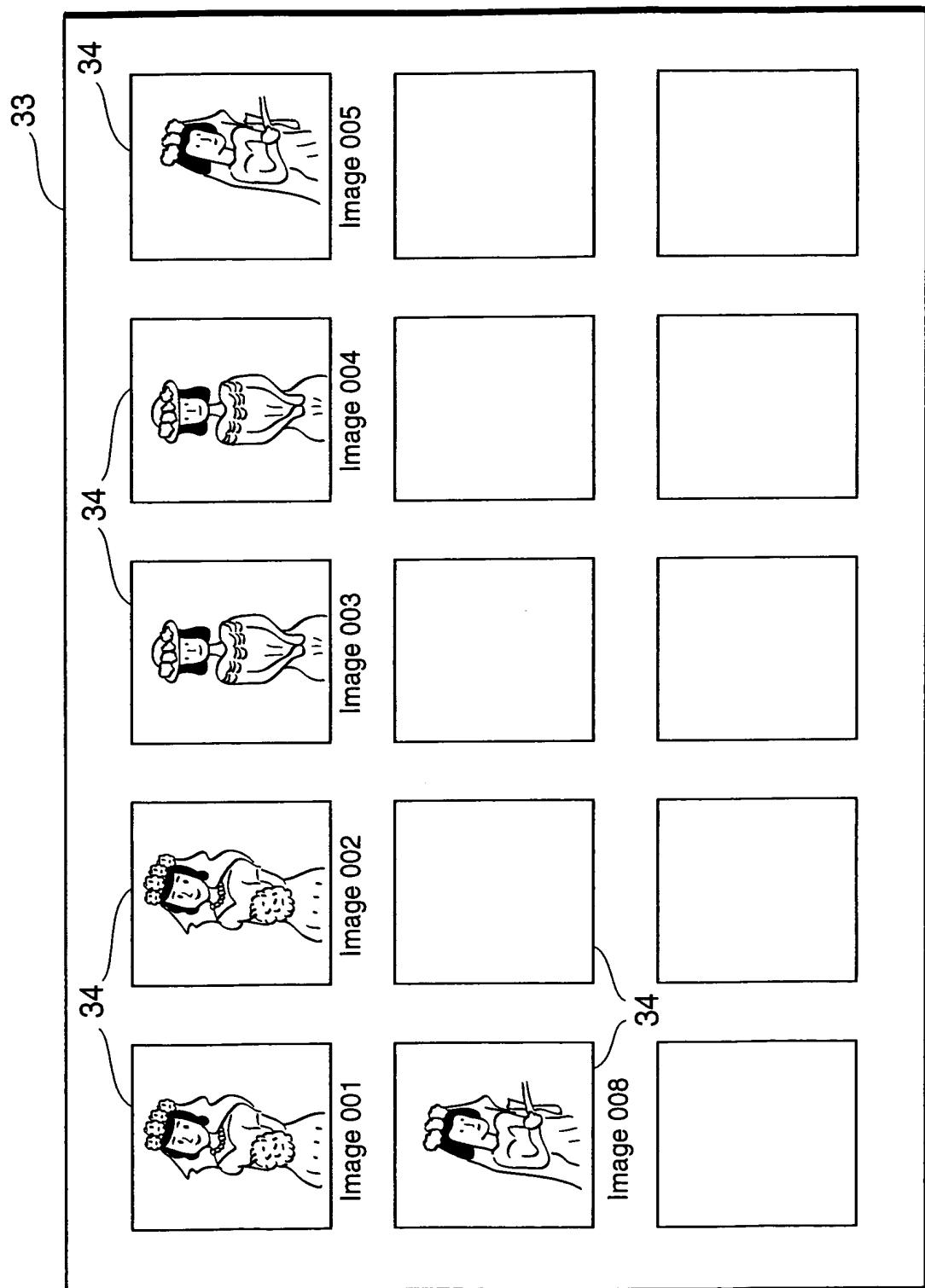
【図2】 FIG. 2



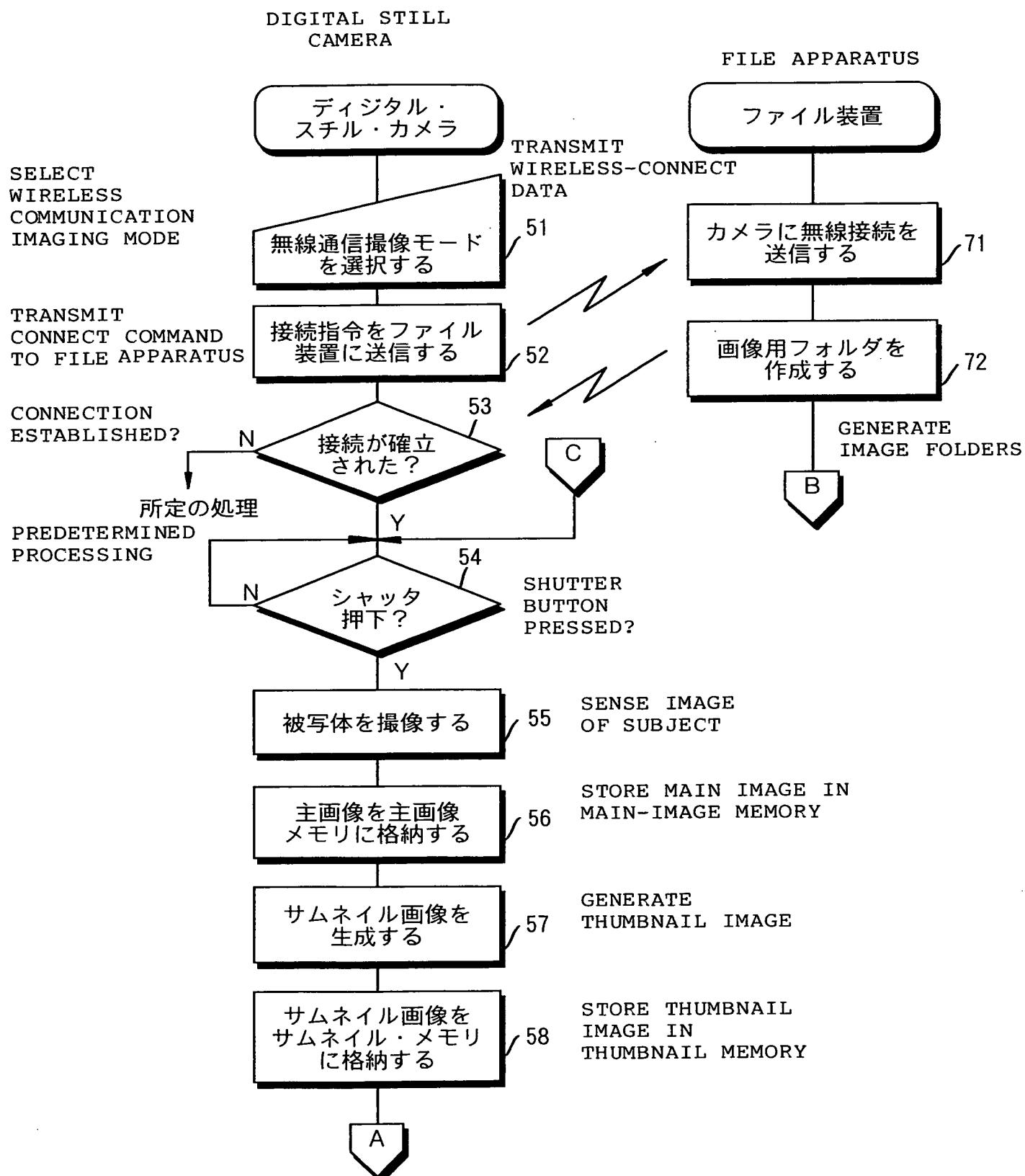
【図3】 FIG. 3



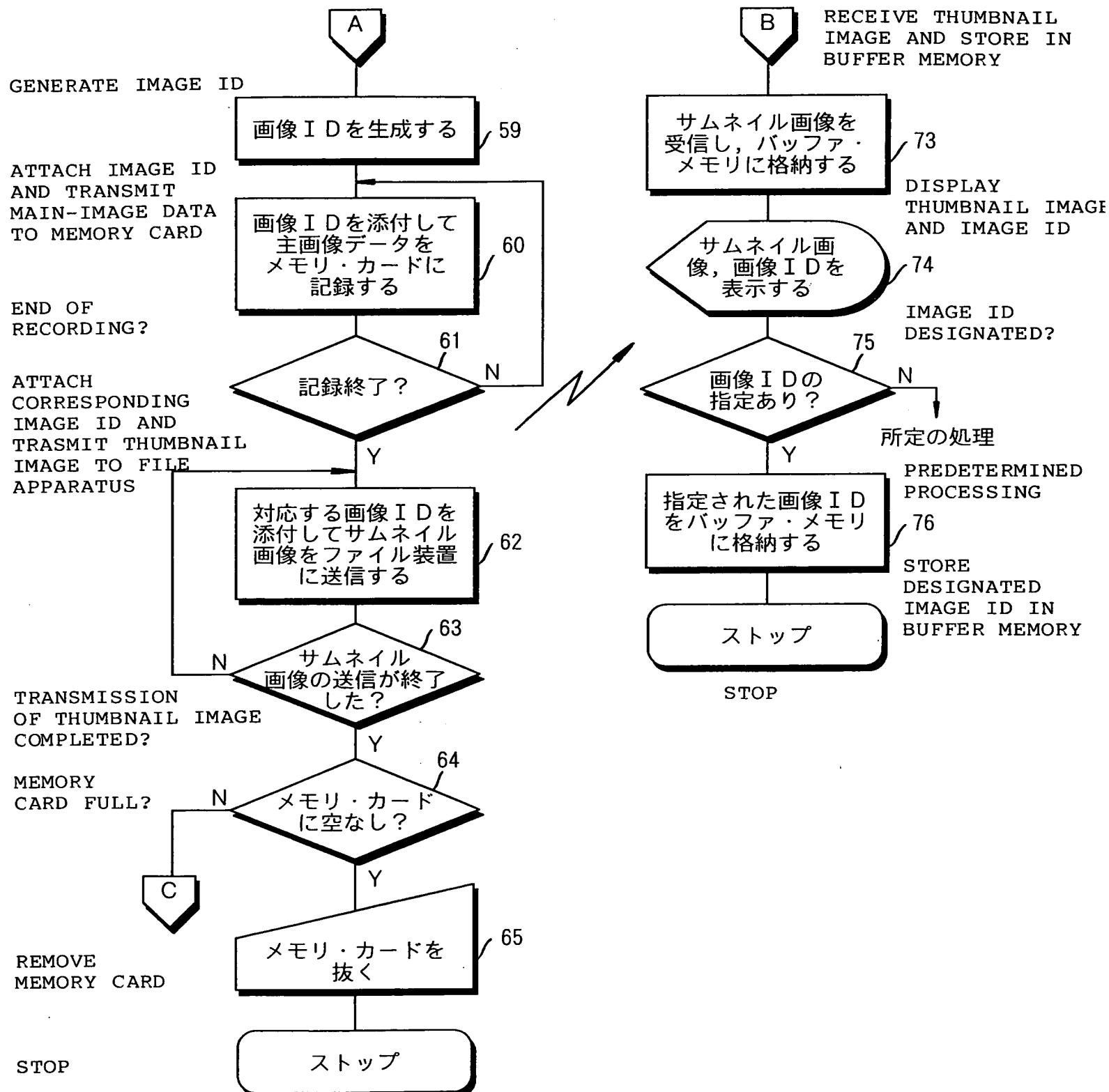
【図 4】 FIG. 4



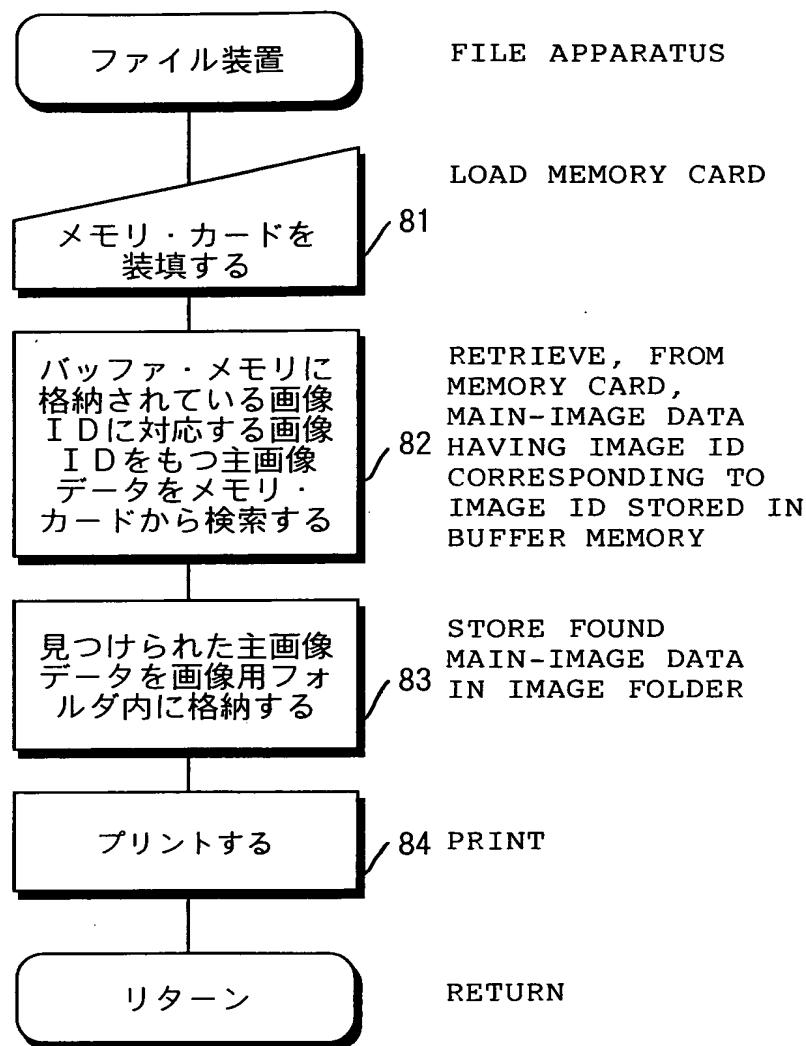
【図5】 FIG. 5



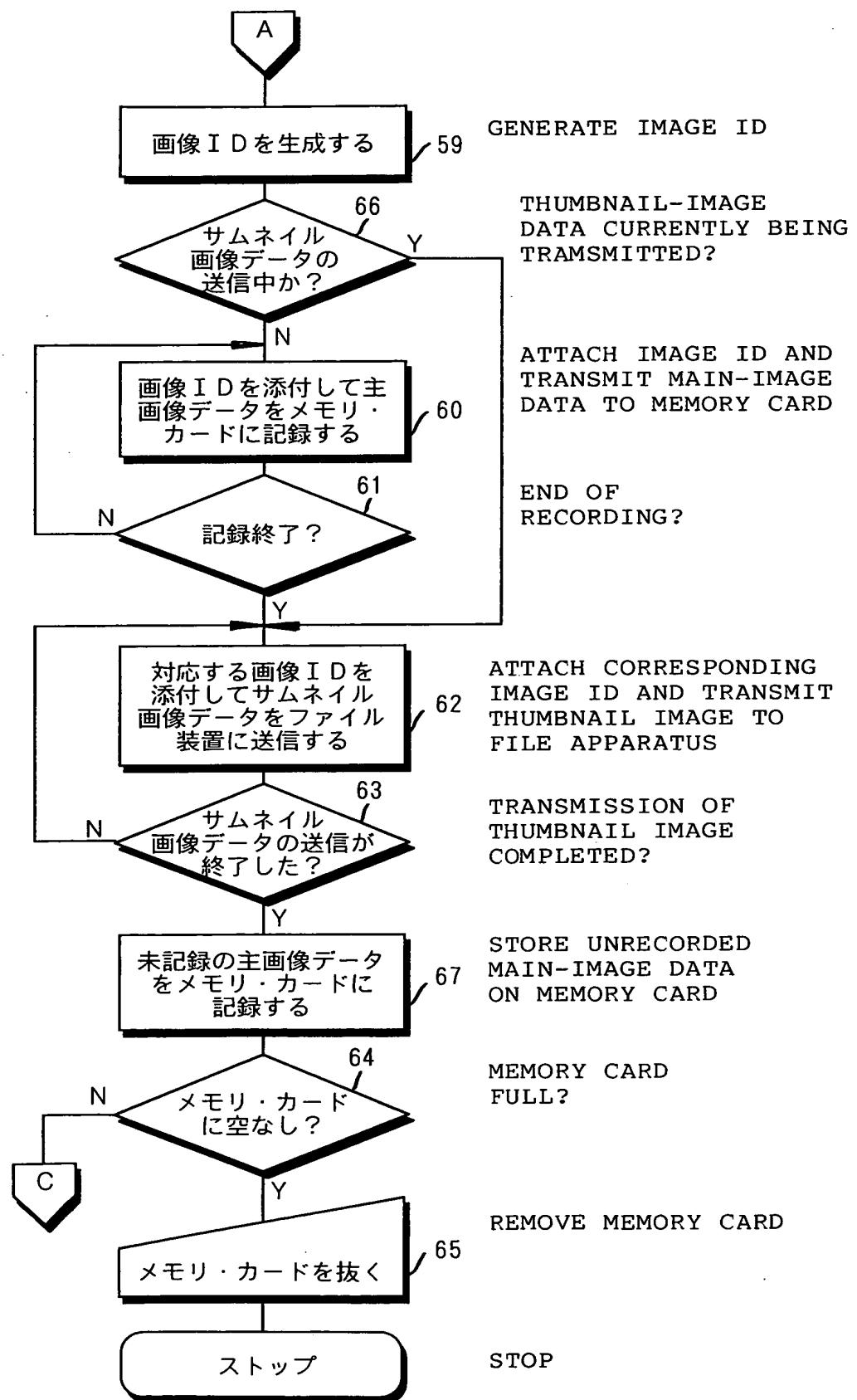
【図6】 FIG. 6



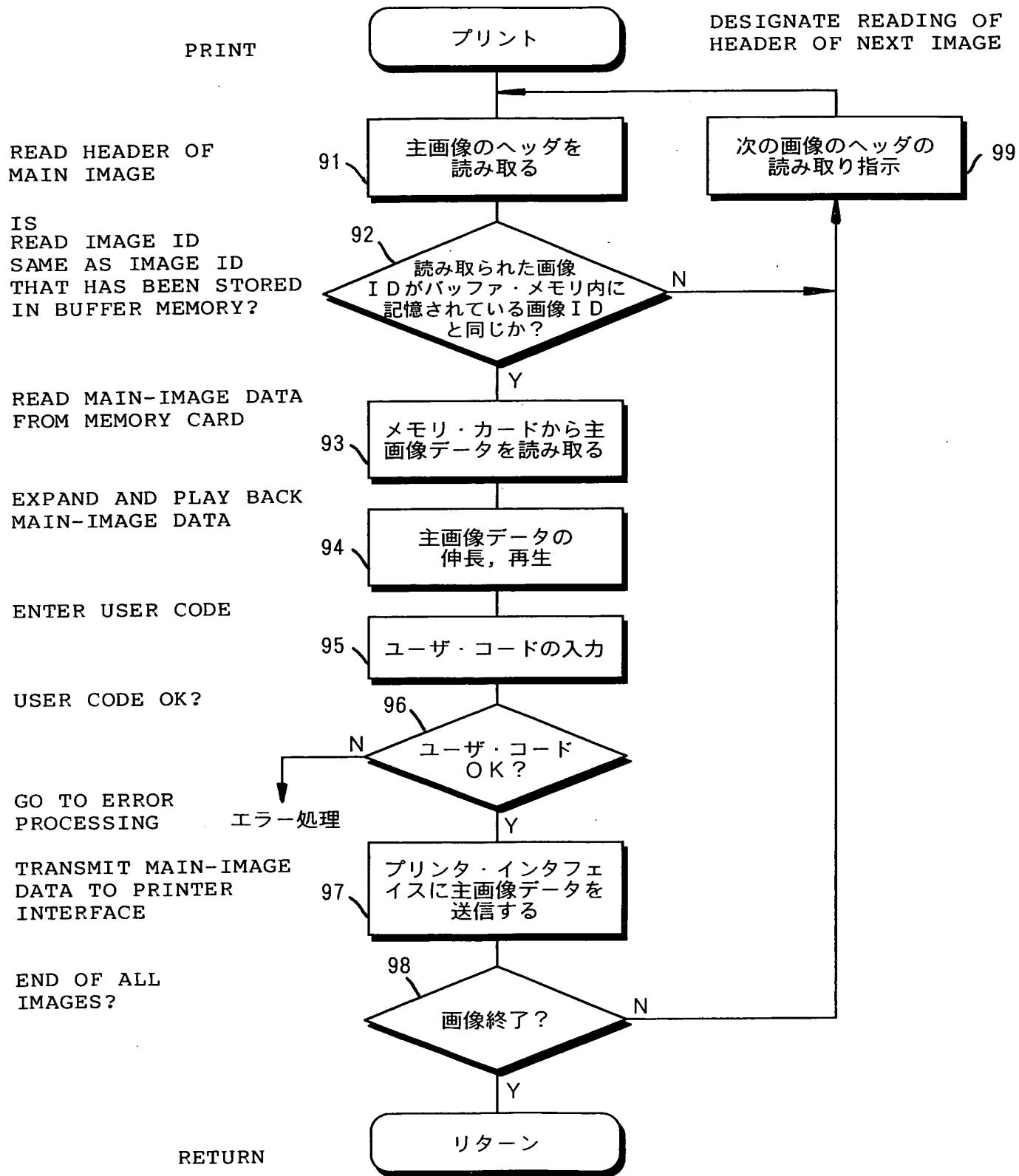
【図7】 FIG. 7



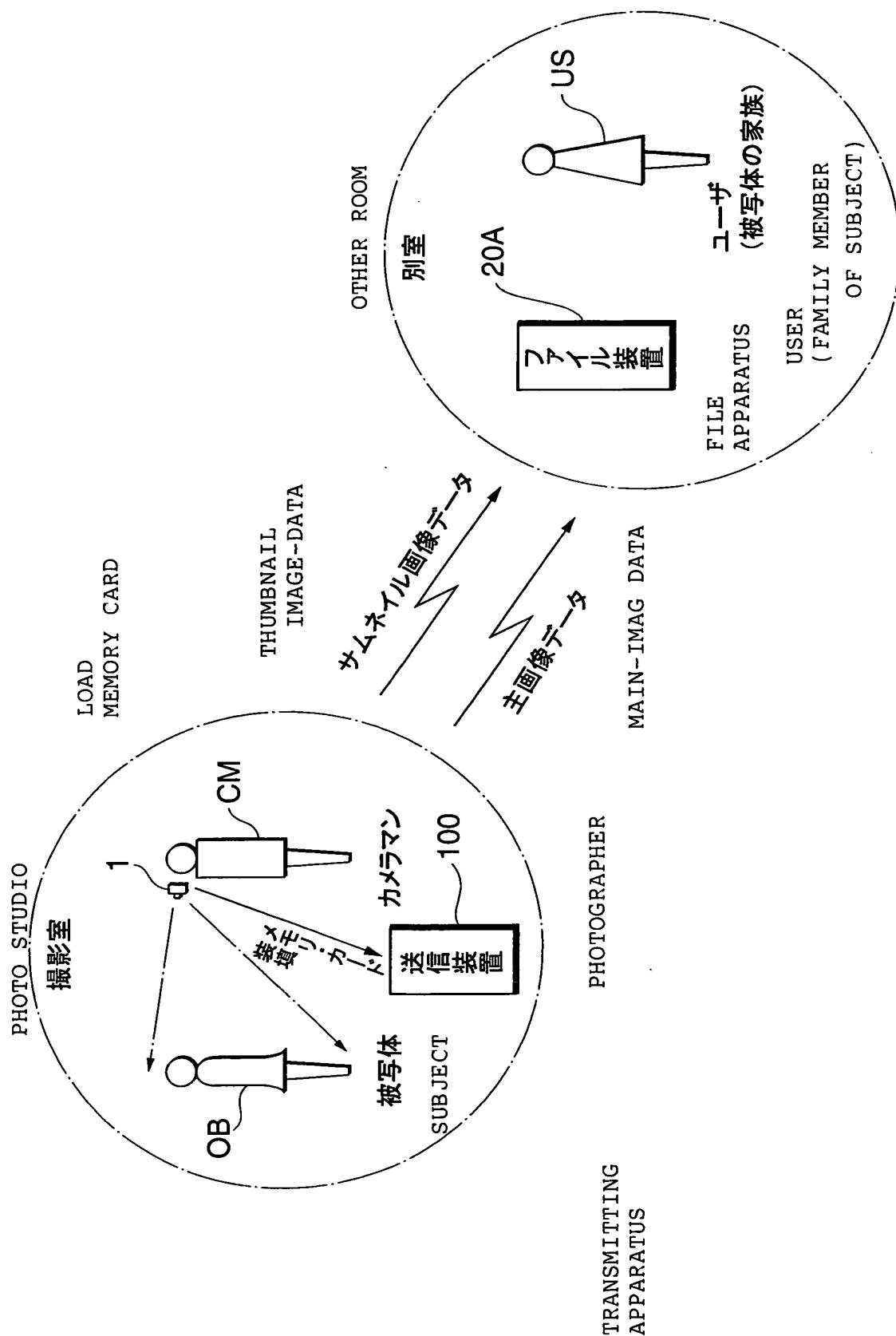
【図8】 FIG. 8



【図9】 FIG. 9



【図 10】 FIG. 10



【図11】 FIG. 11

